

## AMENDMENT TO THE CLAIMS:

This listing of claims will replace all prior versions of claims in the application:

## LISTING OF CLAIMS:

1. (PREVIOUSLY PRESENTED) A dual magnetic tunnel junction head, comprising:  
a free layer;  
first and second antiparallel (AP) pinned layer structures positioned on opposite sides of the free layer, each of the AP pinned layer structures including at least two pinned layers having magnetic moments that are self-pinned antiparallel to each other, the pinned layers being separated by an AP coupling layer;  
a first barrier layer formed of a dielectric barrier material and positioned between the first AP pinned layer structure and the free layer;  
a second barrier layer formed of a dielectric barrier material and positioned between the second AP pinned layer structure and the free layer;  
wherein the head does not have an antiferromagnetic layer.
2. (ORIGINAL) A head as recited in claim 1, wherein the free layer includes a layer of NiFe.
3. (ORIGINAL) A head as recited in claim 2, wherein the free layer further includes layers of CoFe sandwiching the layer of NiFe.
4. (CURRENTLY AMENDED) A head as recited in claim 1, wherein the AP pinned layer- structures have about the same magnetic thickness, and the free layer has a thickness of less than 30Å.

5. (CURRENTLY AMENDED) A head as recited in claim 1, wherein the free layer has a thickness of less than ~~about~~ 30 Å.
6. (ORIGINAL) A head as recited in claim 1, wherein the free layer has a thickness of between about 15 and 25 Å.
7. (ORIGINAL) A head as recited in claim 1, wherein a half voltage of the head is more than two times greater than a half voltage of a head having a substantially similar structure but having only one barrier layer.
8. (CURRENTLY AMENDED) A head as recited in claim 1, wherein the barrier layers are sufficiently thin such that tunneling of charge carriers occurs between adjacent layers ~~the head has a thickness of less than about 500 Å.~~
9. (ORIGINAL) A head as recited in claim 1, wherein the head has a thickness of less than about 300 Å.
10. (CURRENTLY AMENDED) A dual magnetic tunnel junction head, comprising:
  - a free layer ~~having a thickness of less than about 30 Å;~~
  - first and second antiparallel (AP) pinned layer structures positioned on opposite sides of the free layer, each of the AP pinned layer structures including at least two pinned layers having magnetic moments that are self-pinned antiparallel to each other, the pinned layers being separated by an AP coupling layer;
  - a first barrier layer formed of a dielectric barrier material and positioned between the first AP pinned layer structure and the free layer;
  - a second barrier layer formed of a dielectric barrier material and positioned between the second AP pinned layer structure and the free layer;

wherein the head is a current perpendicular to plane head has a thickness of less than about 500Å.

11. (ORIGINAL) A head as recited in claim 10, wherein the free layer includes a layer of NiFe.
12. (ORIGINAL) A head as recited in claim 11, wherein the free layer further includes layers of CoFe sandwiching the layer of NiFe.
13. (CURRENTLY AMENDED) A head as recited in claim 10, wherein the AP pinned layer structures have about the same magnetic thickness, and the free layer has a thickness of less than 30Å.
14. (CURRENTLY AMENDED) A head as recited in claim 10, wherein the free layer has a thickness of less than about 30Å.
15. (CURRENTLY AMENDED) A head as recited in claim 10, wherein the barrier layers are sufficiently thin such that tunneling of charge carriers occurs between adjacent layers ~~free layer has a thickness of between about 15 and 25Å.~~
16. (ORIGINAL) A head as recited in claim 10, wherein a half voltage of the head is more than two times greater than a half voltage of a head having a substantially similar structure but having only one barrier layer.
17. (ORIGINAL) A head as recited in claim 10, wherein the head has a thickness of less than about 300Å.
18. (ORIGINAL) A head as recited in claim 10, wherein the head does not have an antiferromagnetic layer.

19. (CURRENTLY AMENDED) A magnetic storage system, comprising:  
magnetic media;  
at least one head for reading from and writing to the magnetic media, each head  
having:  
a sensor having the structure recited in claim 1, wherein the head has a  
thickness of less than about 300Å;  
a writer coupled to the sensor;  
a slider for supporting the head; and  
a control unit coupled to the head for controlling operation of the head.
20. (CURRENTLY AMENDED) A magnetic storage system, comprising:  
magnetic media;  
at least one head for reading from and writing to the magnetic media, each head  
having:  
a sensor having the structure recited in claim 10, wherein the head has a  
thickness of less than about 300Å;  
a writer coupled to the sensor;  
a slider for supporting the head; and  
a control unit coupled to the head for controlling operation of the head.